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|  | Unit Planner: **POLYNOMIALS** & **MEASUREMENT** Math 1  Tuesday, July 7, 2015, 8:52AM |  |

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| District Wide > 2015-2016 > High School > Mathematics > Math 1 > Week 1 - Week 2 | Last Updated: Tuesday, June 23, 2015 by Mary Wible |

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| |  | | --- | | Big Idea / Conceptual Lens |   **VARIANCE & INVARIANCE** | |  | | --- | | Focus of Study |  * Operations with **polynomial** expressions. * Geometric applications of operations with **polynomials**. * Variables in Volume formulas. |
| |  | | --- | | Standards and Clarifying Objectives |   Choose Standards   |  |  |  | | --- | --- | --- | | ComCore: Literacy in History/Social Studies, Science, & Technical Subjects 6-12 | | | | **ComCore: Grades 9-10** | | | | Capacities of the Literate Individual | | | | **Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language** | | | |  | They respond to the varying demands of audience, task, purpose, and discipline.  Show details  They respond to the varying demands of audience, task, purpose, and discipline.  Hide details  Students adapt their communication in relation to audience, task, purpose, and discipline. They set and adjust purpose for reading, writing, speaking, listening, and language use as warranted by the task. They appreciate nuances, such as how the composition of an audience should affect tone when speaking and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in science). |  | |  | They value evidence.  Show details  They value evidence.  Hide details  Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others’ use of evidence. |  | |  | They use technology and digital media strategically and capably.  Show details  They use technology and digital media strategically and capably.  Hide details  Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals. |  | | ComCore: Mathematics | | | | **ComCore: HS: Algebra** | | | | Seeing Structure in Expressions | | | | **HSA-SSE.A. Interpret the structure of expressions.** | | | |  | HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it.  Show details  HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it.  Hide details  For example, see x⁴ – y⁴ as (x²)² – (y²)², thus recognizing it as a difference of squares that can be factored as (x² – y²)(x² + y²). |  | | **HSA-SSE.B. Write expressions in equivalent forms to solve problems.** | | | |  | HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. |  | |  | HSA-SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. |  | | Arithmetic with Polynomials & Rational Functions | | | | **HSA-APR.A. Perform arithmetic operations on polynomials.** | | | |  | HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. |  | | **ComCore: HS: Geometry** | | | | Geometric Measurement & Dimension | | | | **HSG-GMD.A. Explain volume formulas and use them to solve problems** | | | |  | HSG-GMD.A.3. Use volume formulas for cylinders, pyramids, cones and spheres to solve problems. |  | | |  | | --- | | Enduring Understandings |   [Bloom's Taxonomy](http://community.wvu.edu/~lsm018/Articulate%20Blooms%20Wheel/blooms_wheel.html)  **Students understand that...**   * Expressions have equivalent forms created by the applications of properties.(A.SSE.2&3)(A.APR.1) * Algebraic expressions represent the relationship between quantities.(G.GMD.3) * Formulas represent an invariable relationship between variable numerical values. (G.GMD.3) |
| |  | | --- | | Essential Concepts and Critical Content |   **Critical content: (facts required to ground learning)**  Key Academic Vocabulary:  variable, constant, coefficient, terms, like terms, expression, factor  Formulas:(not given for EOC)  area & perimeter of triangles, rectangles, trapezoids  volume of a cylinder  Concepts:  area, perimeter, volume  equivalence  represent/symbolize  Critical Content:  Steps to add, subtract, multiply and factor **polynomials**.  Apply **polynomial** operations to perimeter & area problems.  Steps to evaluate algebraic representations.  [LEARNING TARGETS FOR POLYNOMIALS.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49933&) | |  | | --- | | Processes, Strategies, and Skills |   **8 Mathematical Practices**  **MP 1 Make sense of problems, & persevere.**  **MP 2 Reasoning abstractly & quantitatively.**  **MP 3 *Critiquing reasoning of others & justifying own work.***  **MP 4 Model with mathematics.**  **MP 5 Use tools of appropriately.**  **MP 6 Attend to precision.**  **MP 7 Seeing Structure.**  **MP 8 Seeing regularity in repeated reasoning & patterns.**  ***Connects to Mathematical Practice 1: Make sense of problems.***  **Process#1:**  Analyzing a prompt given in the form of a diagram or word problem.  **Strategies:**  Identifying key words in context.  Labeling parts of a diagram.  Drawing & labeling a diagram if none is given.  **Skills**:  Explain perimeter, area, volume formulas and use them to solve problems.  Evaluating expressions for given numerical values.  ***Connects to Mathematical Practice 7: Seeing structure***  **Process#2:**  Interpreting a prompt given in the form of a verb & an expression.  **Strategies:**  Recognize specific structures in the expression. (number of terms, type of terms, etc.)  Recognize implied operations.(example: 2x(3x - 4y))  Interpret verb in direction. (example: factor = divide)  **Skills:**  Perform operations with **polynomials**.  Interpret the structure of expressions.  **Connects to Mathematical Practice 3: Construct arguments & critique reasoning and Mathematical Practice 6: Attending to Precision**  **Process #3:**  Explain reasoning and justify mathematical choices.  **Strategies:**  Identify what information is required.  **Skills:**  Use content specific vocabulary.  Use transitional phrases.  Present information logically. |
| |  | | --- | | Essential Questions |   **FACTUAL:**  1 How can I create equivalent **polynomial** expressions?  1 Why are variable expressions used?  2 Why can we use the same process & formula with different expressions?  3 How can I use variables and formulas to solve word problems with perimeter, area, volume?  **CONCEPTUAL:**  ​1 How can we be sure that the expressions created with operations on **polynomials** are equivalent?  1 How are factoring and multiplying of **polynomials** related?  2 Is it possible to correctly represent the same quantities with different algebraic expressions?  2 What are the different roles that variables play in mathematics?  3 What happens if one quantity in a formula changes and another remains the same?  **PROVOCATIVE:**  1 How do equivalent variable expressions manifest in real life?  2 When is it beneficial to use algebraic expressions to represent the relationship between quantities?  3 Why do we use formulas? | |  | | --- | | Resources/Materials |   Resources:  #1. 5 minute video on using Algebra Tiles to add & subtract **polynomials**.  #2. Animated power point - like terms & adding & subtracting **polynomials**  #3 MARS Mathshell Task - Generating **Polynomials** from Patterns (students observe dot patterns & generalize using **polynomials**)  #4 Factoring trinomial lesson plan complete with Powerpoint, handouts & practice worksheet on factoring trinomials without using grouping. Some people refer to this method of factoring as "slip & slide".  #5 & 6 Students investigate the impact of changing radius of composite solid on volume.  **Also see the UNIT GRAPHIC ORGANIZER listed in the Differentiation section!**  [Video using Algebra Tiles to add & subtract polynomials](https://www.youtube.com/watch?v=ko-BmQE84ls) [PowerPoint: Like terms & adding & subtracting polynomials](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49897&) [MARS Mathshell Task - Generating Polynomials from Patterns](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49898&) [Factoring trinomial lesson plan](http://alex.state.al.us/lesson_view.php?id=4152)  [Students investigate 1](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49900&) [Students investigate 2](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49901&) |
| |  | | --- | | Formative, Interim, and Summative Assessments |   Add New Assessment   |  |  | | --- | --- | |  | gum drop  Pre Assessment: Performance: Skill Demonstration  Tasks require students to recognize & combine like terms & justify their results.  Quick 5 minute task to check prior knowledge.  [Gum Drop Formative and Answer Key.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48919&SourceSiteID=3005&)  2 Standards Assessed  Hide Standards   * HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. * HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. | |  | golden ticket  Formative: Written: Quick Write  Students analyze the accuracy of a given problem, then explain in writing how to work it correctly, and justify response.  [Golden Ticket and Answer Key - exit ticket.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48920&SourceSiteID=3005&)  3 Standards Assessed  Hide Standards   * HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. * HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. * HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | |  | Volume of Cylinders & Spheres  Formative: Performance: Skill Demonstration  Students apply volume formulas as they investigate how changing one variable value (radius or height) & holding one variable constant impacts the volume.  \*Teachers should emphasize that students must know the formula for volume of a cylinder. Other volume formulas are provided on EOC.  [fun\_size\_can\_rubric.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48942&SourceSiteID=3005&) [funsize\_cans varying radius & systems with SA.pdf](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48943&SourceSiteID=3005&)  1 Standard Assessed  Hide Standards   * HSG-GMD.A.3. Use volume formulas for cylinders, pyramids, cones and spheres to solve problems. | |  | Factoring Foldable  Formative: Project: Product Based  Students create their own Factoring Foldable using their notes & given problems.  This requires the students to discriminate between types of problems & methods of factoring.  This is to be done after instruction on methods of factoring has been completed.  [FACTORING FOLDABLE ASSIGNMENT.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48939&SourceSiteID=3005&)  1 Standard Assessed  Hide Standards   * HSA-SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. | |  | Unit Test  Summative: Test: Post Test  18 question constructed response unit test on A.APR.1, A.SSE.2 & 3, G.GMD.3  [Math 1 Test poly & factor & vol.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48938&SourceSiteID=3005&)  5 Standards Assessed  Hide Standards   * HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. * HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. * HSA-SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. * HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. * HSG-GMD.A.3. Use volume formulas for cylinders, pyramids, cones and spheres to solve problems. | |  | Polynomial Perimeters  Summative: Performance: Skill Demonstration  Students will apply addition and multiplication of polynomials to find the perimeter & area of a composite figure.  [POLYNOMIAL PERIMETERS.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=48936&SourceSiteID=3005&)  3 Standards Assessed  Hide Standards   * HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. * HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. * HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. | |  | R.A.F.T  Summative: Project: Product Based  Students choose from several options & must use a digital tool to present the RAFT.  A grading rubric for self-assessment & teacher assessment is included.  Incorporates writing & technology.  [POLYNOMIAL RAFT.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=50008&SourceSiteID=3005&)  6 Standards Assessed  Hide Standards   * They respond to the varying demands of audience, task, purpose, and discipline. * They use technology and digital media strategically and capably. * HSA-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. * HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. * HSA-APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. * HSG-GMD.A.3. Use volume formulas for cylinders, pyramids, cones and spheres to solve problems. |   7 record(s) found. | |
| |  | | --- | | Integration Opportunities (Optional) |   Choose Standards   |  |  |  | | --- | --- | --- | | P21: 21st Century Student Outcomes | | | | **P21: K-12** | | | | Learning & Innovation Skills | | | | **Critical Thinking and Problem Solving Reason Effectively**  **Show details**  **Critical Thinking and Problem Solving Reason Effectively**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation |  | | **Make Judgements and Decisions**  **Show details**  **Make Judgements and Decisions**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Effectively analyze and evaluate evidence, arguments, claims and beliefs |  | | **Collaborate with Others**  **Show details**  **Collaborate with Others**  **Hide details**  **Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.** | | | |  | Demonstrate ability to work effectively and respectfully with diverse teams |  | | Life & Career Skills | | | | **Be Flexible**  **Show details**  **Be Flexible**  **Hide details**  **Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.** | | | |  | Deal positively with praise, setbacks and criticism |  | | **Work Independently**  **Show details**  **Work Independently**  **Hide details**  **Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.** | | | |  | Monitor, define, prioritize and complete tasks without direct oversight |  | | **Social and Cross-Cultural Skills Interact Effectively with Others**  **Show details**  **Social and Cross-Cultural Skills Interact Effectively with Others**  **Hide details**  **Today’s life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.** | | | |  | Know when it is appropriate to listen and when to speak |  | | |  | | --- | | Additional Integration Opportunities (Optional) |   **READING**:  Students will use critical reading strategies listed in processes when analyzing prompts such as: Volume investigations, **polynomial** perimeters & RAFT  **WRITING**:  Students will use mathematically precise vocab to create written arguments and explanations in tasks such as: exit tickets, RAFT, factoring foldable  **SPEAKING & LISTENING**:  Students will critique reasoning of others & share their own reasoning using mathematically precise vocabulary, appropriate expressions of agreement/disagreement.  **TECHNOLOGY:**  Students will use digital tools to create work product for the RAFT assessment & viewing video. |
| |  | | --- | | Character Qualities (Optional) |  |  |  | | --- | --- | | * Self-discipline * Responsibility * Integrity * Cooperation | Expectations are set in this first unit to communicate the value of these character qualities in the classroom as well as how these qualities are manifested. | | |  | | --- | | Differentiation/Intervention Focus Areas (Optional |   **ATTACHMENT: GRAPHIC ORGANIZER FOR UNIT PLAN**  Graphic Organizers help students visualize how the day to day lessons & concepts connect & build.  **For students who need more support:**   * Provide step by step instructions. * Provide examples or models. * Teach self-questioning skills to help target "point of confusion". * Teach how to articulate "point of confusion" or request for help. * Provide ways for students to self-check. * Reduce number of problems or stimuli to be worked with at one time.   **For students who need more challenge:**   * Reduce the number of directions, making the tasks more open ended. * Allow students to generate questions to be answered or investigated. * Request that students use multiple models or representations & articulate the connections. * Encourage the students to find patterns, generalizations or "short cuts" and prove that they work for all numbers.   EXAMPLE:  If the Factoring Foldable Assessment:  Providing more structure would consist of identifying the **polynomials** for the students to put in each section and identifying the tab titles & exact type of foldable to use.  Providing less structure would consist of requiring students to find their own problems, identify their own tab names, & choose whatever format for the foldable that they want to use.  [GRAPHIC ORGANIZER FOR POLYNOMIAL UNIT.docx](https://onslowcounty.rubiconatlas.org/Atlas/View/File?AttachmentID=49903&) |

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